

## Comprehensive Course Syllabus

### **\*Biology of Behavior**

#### **\*Course Description:**

*In this course, students will examine the different neural, biochemical, evolutionary, ecological, and social pressures that influence behavior. Once students gain a base understanding of these different fields of study, we will focus on learning, mate choice, social dynamics, and behavioral disorders. The last unit will involve students' choice for topics. Examples for this unit might include impact of art or music on human interactions and evolution of our behaviors.*

#### INSTRUCTOR(S):

A/C mod 7/8

- **\*Sarah O'Leary-Driscoll**
- Office Number (When and where you are available for help.):  
B160 TBA or by appointment
- Telephone number(s): ext 5363
- Email address(es): [soleary@imsa.edu](mailto:soleary@imsa.edu)

B/D Mod 3/4

- **\*Jessica Amacher**
- Office Number (When and where you are available for help.):  
B160 TBA or by appointment
- Telephone number(s): ext 5493
- Email address(es): [jamacher@imsa.edu](mailto:jamacher@imsa.edu)

#### **Text(s) / Materials:**

*Behave: The Biology of Humans at their Best and Worst by Robert Sapolsky  
Selections from Steven Pinker (Blank Slate, etc). Evolution of Everything by Matt Ridley,  
and other relevant works.*

## ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®

*igniting and nurturing creative, ethical scientific minds that advance the human condition*

### **\*Essential Content:**

#### I. Introduction to Behavioral Ecology, Evolutionary Psychology, and Ethology

- *history of the field*
- *comparisons between the methods of study*
- *major methods used in each*

#### II. Proximal vs Ultimate Causes

- *Tinbergen's 4 Questions*
- *Phylogeny (evolution) & Function (adaptation)*
  - *this unit will include a review of evolutionary mechanisms and how they relate to the development of animal behaviors*
- *Mechanisms (causation) & Ontogeny (development)*
  - *this unit will focus on the basis for behavior from a causal standpoint (i.e. mutations, etc) and a developmental standpoint (regulation, epigenetics, environmental factors)*

*Inquiry Activities in this unit may include observation and experimentation with C. elegans and some genomics work (sequence analysis and phylogenetic tree creation) to examine the bases of behavior*

#### III. Fundamentals of Behavior

- *Habitat Selection*
- *Learning & Tool Usage*
- *Feeding & Foraging*
- *Predator & Prey interactions*
- *Cooperation*
- *Social Behavior*

*This unit will be largely student driven through research and presentation. Inquiry Activities in this unit may include observation and experimentation with Drosophila Melanogaster, as well as a field trip to the Brookfield Zoo.*

#### IV. Mating & Reproduction

- *Sex, Gender Development, and Sexual orientation*
- *Sexual Selection*
- *Parental Care*

*This unit will look at mating from the standpoint of biological sex and fundamental reproduction in animals as well as examine some of the biological, regulatory, and environmental factors that, from a scientific standpoint, show some connections with the development of gender identity and sexual orientation. Inquiry activities in this unit will likely include interactive modeling of selection and mate choice.*

#### VI. Communication

## ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®

*igniting and nurturing creative, ethical scientific minds that advance the human condition*

- Development of Language
- Emotion and Expression
- Emergence of “Song” and environmental influences

*This unit will include selected readings from books and scientific literature. Inquiry activities in this unit will involve experimentation of an observational nature, with student designed questions, on language and expression.*

### VII. Human Evolution

- *History of the Field*
- *“Becoming Human” documentary*
- *Animal Behavior as a Model For Human Behavior*
- *Uniqueness and Commonalities of Human Evolution*
- *Co- Evolution (i.e. pets)*

*This unit will include selected readings from books and scientific literature.*

### VIII. Special Subjects & Non-normative Behaviors

- Mental Health disorders
- Addiction Disorders
- ”Viral” social phenomena (i.e. memes)
- Conspiracy
- Anti-social behaviors and Biases

*This unit will likely be student driven, with specific research areas and readings being presented by various student groups.*

### IX. Student Choice

*For the final unit of the course, students will choose a specific avenue of research within one of the broader areas that were studied, and complete a capstone project (podcast creation) with a group of students.*

### **Schedule:**

Each unit will take approximately 1-3 weeks, with Units I through VI covered in the first quarter and VII through IX in the second.

### **\*SSLs and Outcomes:**

*IA. Students are expected to demonstrate automaticity in skills, concepts, and processes that enable complex thought by:*

## ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®

*igniting and nurturing creative, ethical scientific minds that advance the human condition*

- *completing homework activities and assigned reading to support content,*
- *becoming adept at identified lab skills,*
- *demonstrating competence on quizzes, and*
- *applying content knowledge with novel scenarios and problems.*

*IB. Students are expected to construct questions, forge connections and deepen meaning*

- *informally in discussion groups, during set up and analysis of labs, and when observing data from experiments, and*
- *on formal assessments.*

*IC. Students are expected to precisely observe phenomena and accurately record findings*

- *through formative and summative assessments, and*
- *through analysis of data generated from lab experiments.*

*ID. Students are expected to evaluate the soundness and relevance of information and reasoning*

- *by evaluating sources for research papers,*
- *through analysis of experiments completed in lab, and*
- *through explanation of models of phenomena in biology.*

*IIA. Students confront misconceptions*

- *by completing pre-assessments,*
- *engaging in discussion in class, and*
- *completing a follow-up assessment to determine extent of resolution of misconceptions.*

*IIIA. Students use appropriate technologies as extensions of the mind*

- *through daily use of computers, including web sources and videos,*
- *by using the course website as a resource,*
- *by using computers to create graphical representations and perform other analyses of laboratory data, and*
- *through use of standard laboratory equipment.*

*IIIB. Students recognize, pursue, and explain substantive connections within and among areas of knowledge*

- *by studying the chemistry behind the biology, and*
- *by studying the connections between areas within biology.*

*IIIC. Students recreate models and systems in biology, such as cell theory, evolution, DNA synthesis, as well as structures and functions of the cell and DNA, etc.,*

- *with classroom discussion, projects, and activities, and*
- *on formal assessments.*

*VB. In order for students to make reasoned decisions which reflect ethical standards, and act in accordance with those decisions, students*

- *are made aware of what plagiarism is, its ethical implications, and repercussions of plagiarizing,*

## ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®

*igniting and nurturing creative, ethical scientific minds that advance the human condition*

- *are made aware of the scientific and ethical significance of accurately representing data (vs. not skewing data to fit expectations), and are assessed for the authenticity of written work and the efficacy of analysis of lab experimentation.*

### **\*Instructional Design and Approach:**

*This course helps to fill a gap in our curriculum addressing more psychology related fields, but in this case coming from a biological perspective. It is also, by its nature, cross disciplinary, as the topics will require investigation into different aspects of human behavior and societies, and how we gain understanding in these fields. It will also touch on neurobiology, something that our students often wish to pursue beyond its inclusion in molecular and physiology courses.*

*In this course, students will engage with the material in a variety of ways. After learning some necessary core concepts, other activities would involve reading work written by experts in the field, engaging in research into topics assigned or of their choosing, communicating understanding through presentations, papers, and posters, and a variety of other avenues. The lab components are still to be determined, but may include work with *C. elegans*, as well as simulations and analyses the students can do with each other or with pre-existing data.*

### **\*Student Expectations:**

#### **1) Late work:**

Students may submit work late with a penalty of 10% each day the assignment is late up to 3 calendar days maximum. Once any assignments are returned to students with grades/comments, this late work will not be accepted. Once the deadline has passed, a zero will be assigned.

Computer problems of any kind (including document corruption, hard drive failure, problems with uploading to Moodle) will not be treated as acceptable excuses for submitting late work. This being the case, it would be wise to make a backup copy of any computer work that you do for this course, and we suggest ensuring that you've received return receipts in your email from Turnitin. However, if you are having problems getting your work in, it is recommended that you talk with your teacher.

#### **2) Attendance:**

See the IMSA handbook for official attendance policy. If you have a counselor excused absence, or an unexcused absence, you will not be able to make up the missed work. This includes earning a zero on any tests or quizzes given during the missed period.

## ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®

*igniting and nurturing creative, ethical scientific minds that advance the human condition*

If you have an excused absence, be sure to contact your teacher to find out what you will miss. If that is not possible, you should see your teacher as soon as possible to discuss your absence. It is **your responsibility** to follow up on what you missed in class.

### **3) Plagiarism:**

Plagiarism is unacceptable and will be dealt with as per IMSA policy on academic dishonesty. Plagiarism includes, but is not limited to, knowingly using another person's work – whether it is a student or a research paper – as your own, improper citations and bibliographic information, improper use of secondary sources, or any other behavior that is deemed dishonest.

### **\*Assessment Practices, Procedures, and Processes:**

Assessments may include quizzes, tests, presentations, projects, writing assignments, and homework. We will also be gauging student progress with respect to both learning skills and mindset, as highlighted in the Standards of Significant Learning.

Tests are used to examine factual knowledge and problem solving. Also, students will be asked to apply knowledge gained in class to address novel situations (approximately 30-40% of any individual test grade). We call this ability 'transfer' and tests generally prompt a developing skill over the course of time.

Written reports are used to examine both communication and critical thinking skills in students. Students will be asked to forge connections between the lab activities or literature research and a broader context in the field of Biology. This sort of work mimics science practice and expands student thinking in science.

Projects and Presentation: This category of student work examines model building and critical thought. This complements reports as students must draw upon various activities and knowledge to construct holistic models that represent their understanding.

Various categories of work are not weighted to calculate the student grades in this course. Instead, a running total of all work is maintained to reflect on student grades. An approximate contribution percentage of categories of assessment toward the final grade is:

- Formative assessment: projects, reports, presentations: 60%
- Summative assessments: tests and major projects: 40%

Grading generally follows the scale:

90% and above = A

80-89% = B

70-79% = C

Below 70% = D

Major assessments will be graded and returned to students for review as soon as possible. This will usually be seven to ten days for tests, major projects and reports. Formative work that demands quick turnaround time to support continued student progress will be given priority in grading.

**ILLINOIS MATHEMATICS AND SCIENCE ACADEMY®**

*igniting and nurturing creative, ethical scientific minds that advance the human condition*